

I. CLAIMS 27-29, 32, 45 AND 46 SATISFY THE REQUIREMENTS OF 35 U.S.C. §112, FIRST PARAGRAPH

The Office Action rejects claims 27-29, 32, 45 and 46 under 35 U.S.C. §112, first paragraph as containing subject matter not described in the specification. Applicants respectfully disagree with this assertion. However, to expedite the prosecution of this application, claims 27-29, 32, 45 and 46 have been cancelled.

Withdrawal of the rejection under 35 U.S.C. §112, first paragraph is respectfully requested.

II. THE CLAIMS DEFINE ALLOWABLE SUBJECT MATTER

The Office Action rejects claims 26, 30-31 and 33-34 under 35 U.S.C. §103(a) as unpatentable over U.S. Statutory Invention Registration H1435 to Cherne et al. (hereinafter "Cherne") in view of U.S. Patent No. 5,920,085 to Han et al. (hereinafter "Han") and further in view of U.S. Patent No. 5,623,155 to Kerber et al. (hereinafter "Kerber"); and claims 35-36, 38, 40-42 and 58 under 35 U.S.C. §103(a) as unpatentable over Cherne in view Han, Kerber and U.S. Patent No. 5,616,935 to Koyama et al. (hereinafter "Koyama"). These rejections are respectfully traversed.

Cherne, in combination with Han, Kerber, and/or Koyama, does not teach or suggest the claimed invention, as claimed in claims 26, 30-31, 33-36, 38, 40-42 and 58.

Regarding independent claim 26, Cherne in combination with Han, does not teach or suggest a thin film transistor comprising, inter alia, a silicon film in which a channel region is formed, the channel region including an extension in a channel width direction, and a gate electrode exhibiting higher thermal conductivity than that of the silicon film, the gate electrode formed over the channel region and covering up the extension, as claimed in independent claim 26.

The Office Action admits that the Cherne does not disclose a thin film transistor having a gate electrode comprising a material exhibiting higher thermal conductivity than that

of the silicon film. The Office Action asserts that Han, at col. 1, lines 50-60 teaches forming a TFT gate electrode of polysilicon or metal. The Office Action, at page 5, asserts that "[i]t would have been obvious to one skilled in this art to form Cherne et al's thin film transistor's gate electrode 21 of metal, rather than polysilicon, because metal and polysilicon are used interchangeably for a thin film transistor's gate electrode, as taught by Han et al."

However, the Office Action's interpretation of Cherne and Han is incorrect. Neither Cherne nor Han teach or suggest a thin film transistor having a gate electrode formed over the channel region and covering up the extension, as claimed in claim 26. First, Han is devoid of any teaching of a structure having a gate electrode formed over the channel region and covering up the extension, as claimed in claim 26. Second, while Cherne, at col. 4, lines 17-34 and in Figs. 3 and 4, discloses a CMOS whose channel region 14 has protruded sections 31, 32, in Cherne, the purpose of the protruded sections 31, 32 is to reduce current leakage at the OFF state of the CMOS.

In contrast to Cherne, in the claimed invention, the extension in a channel width direction is arranged so as to suppress temperature rise in the channel region at ON state of the TFT. Thus, the feature of a gate electrode formed over the channel region and covering up the extension is an important element to achieve the objective of radiating the heat generated in the channel region. Without being covered up by the gate electrode, the extension does not work as a radiator.

In contrast to the claimed invention, Cherne, at col. 4, line 21, discloses that a polysilicon, which is equivalent to the silicon film formed underneath thereof, is used as a gate electrode. Therefore, Cherne discloses that the thermal conductivity is the same between the gate electrode and the channel, and thus heat radiation from the channel to the gate electrode cannot be achieved. In Cherne, the protruded sections 31, 32 of the channel region never work as a heat radiator.

Further, the recited feature of a gate electrode exhibiting higher thermal conductivity than that of the silicon film, as claimed in claim 26, enables the TFT to suppress the temperature rise of the channel region at ON state of the TFT because the heat generated in the channel region during the ON state can be radiated towards the gate electrode with higher thermal conductivity. Thus, the recited feature of a gate electrode exhibiting higher thermal conductivity is an important element to achieve the objective of radiating the heat generated in the channel region.

Moreover, while assuming *arguendo* that Han teaches forming a gate electrode of a polysilicon or metal, Han only teaches improving a ratio of an ON electric current and on OFF electric current. Han does not teach or suggest improving thermal conductivity of the TFT. Therefore, Applicants respectfully submit that the Examiner is using impermissible hindsight to combine Han with Cherne (whose objective is to reduce current leakage at the OFF state of the CMOS).

Further, neither Kerber nor Koyama make up for the deficiencies of Cherne or Han.

As required by MPEP Section 706.02(j), to establish a prima facie case of obviousness, these basic criteria must be met:

- 1) There must be some suggestion or motivation in the references themselves or in the knowledge generally available;
- 2) Reasonable expectation of success;
- 3) The prior art reference must teach or suggest all claim limitations.

The first and third requirements have not been met by the rejections of the Office Action. Neither Cherne, nor Han, Kerber or Koyama, show any motivation to modify the structure to achieve the claimed invention, and the Office Action clearly admits that there is an essential part of the claimed invention missing in Cherne.

For at least these reasons, it is respectfully submitted that independent claim 26 is distinguishable over the applied art. Claims 30-31, 33-36, 38, 40-42 and 58, which depend

from independent claim 26, are also distinguishable over the applied art for the reasons discussed above as well as for the additional features they recite. Withdrawal of the rejections under 35 U.S.C. §103(a) is respectfully requested.

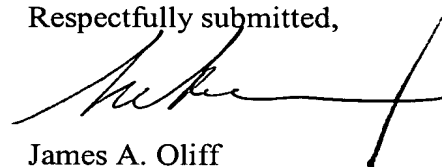
New claim 61 is also patentable over the applied art because none of the applied art, either alone or in combination, teaches or suggests the recited feature of heat generated in a channel region is radiated through the gate electrode, as claimed in claim 61. In the claimed invention, the heat generated in the lower thermal conductivity channel region of the TFT is thermally radiated through the higher thermal conductivity gate electrode.

III. CONCLUSION

For at least the reasons discussed above, it is respectfully submitted that this application is in condition for allowance.

Should the Examiner believe that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below.

Respectfully submitted,



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APPENDIX

Changes to Claims:

Claims 27-29, 32, 45 and 46 are canceled.

Claim 61 is added.